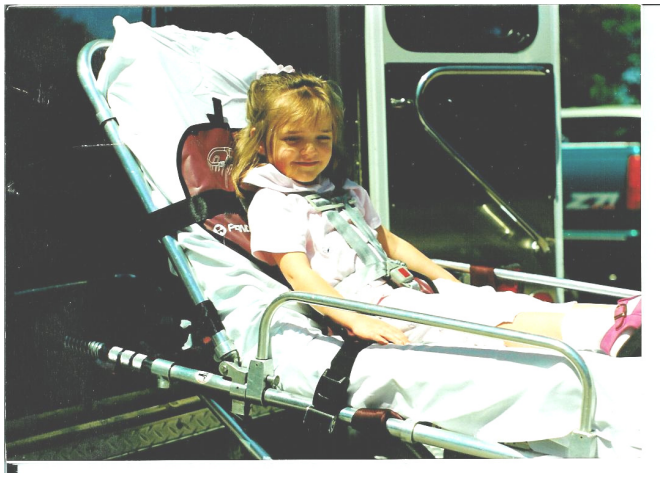
Transporting Children Safely in Ambulances



Instructor Guide

July 2010

MAINE EMS

Buckle Up MAINE!

Table of Contents

Transporting Children Safely in Ambulances Class Instructions

The following procedures should be completed in order to successfully teach the Transporting Children Safely in Ambulances (TCSIA) class:

Equipment

Each Maine EMS Region has the following equipment for use with the class:

- Cosco Scenera convertible car seat
- Cosco Dream Ride infant car bed
- Ferno Pedi-Mate
- Ferno Pedi-Pac
- Pediatric collar
- Infant doll
- Child doll

Contact your local EMS Region to inquire about their policy on borrowing the TCSIA equipment. In addition to the equipment obtained from the region, you must also secure the use of an **ambulance stretcher** (complete with leg, waist, chest and shoulder straps), and **LCD projector and a computer**.

Student Handouts

It is recommended that each student receive handouts that include a copy of the PowerPoint slides. Please refer to the TCSIA Instructor CD for master copies of the handouts.

Scheduling and Promotion

The class should be scheduled for a two-hour time frame. It is part of the Maine EMS Standardized Program and students who complete the class are eligible to receive **two (2) Category 1 CEUs**. Promote the class by customizing and distributing the brochure found on your instructor CD.

Rosters, Evaluations and Certificates

A roster, class evaluation form and a CEU certificate are located on the Instructor CD. Print out as many as you need for the class and distribute one certificate to each student who attends and participates in the entire class. A helpful tip is to not distribute the certificates until after the class evaluations are completed. Be sure to remind the students to keep their certificate for submission to Maine EMS when they renew their EMS license.

Maine EMS

Department of Public Safety
45 Commerce Drive Suite 1
152 State House Station
Augusta, ME 04333-0152
Regional Maine EMS Offices
Phone: (207) 626-3860
Fax: (207) 287-6251
http://www.maine.gov/dps/ems/

Maine EMS Regional Offices

Region 1: York, Cumberland, and Sagadahoc Counties

Southern Maine EMS
10 Vocational Drive
South Portland, ME 04106
PH: 207-741-2790
FAX: 207-741-2158
E-mail: smems@smems.org
Website: http://www.smems.org

Region 2: Androscoggin, Franklin, and Oxford Counties

Tri County EMS
300 Main St.
Lewiston, ME 04240
PH: 207-795-2880
FAX: 207-795-2883
E-mail: tcems@agate.net
Website: http://www.tricountyems.org

Region 3: Kennebec and Somerset Counties

Kennebec Valley EMS
71 Halifax St.
Winslow, ME 04901
PH: 207-877-0936
FAX: 207-872-2753
E-mail: kvems@mint.net
Website: http://www.kvems.org

Region 4: Hancock, Penobscot, Piscataquis, and Washington Counties

Northeast EMS
354 Hogan Road
Bangor, ME 04401
PH: 207-942-4669
FAX: 207-942-3237
E-mail: neems@mint.net
Website: http://www.northeastems.org

Region 5: Aroostook County

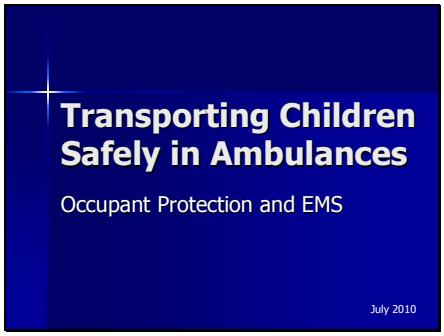
Aroostook EMS
P.O. Box 782
Presque Isle, ME 04769
PH: 207-769-7561
FAX: 207-764-9430
E-mail: aems@mfx.net
Website: http://www.reg5ems.org

Region 6: Lincoln, Waldo, and Knox Counties

Mid Coast EMS
P.O. Box 610
Union, ME 04862
PH: 207-785-5000
FAX: 207-785-5002
E-mail: mcems@mint.net
Website: http://www.midcoastems.com

Class Slides with Instructor Notes

Slide 1



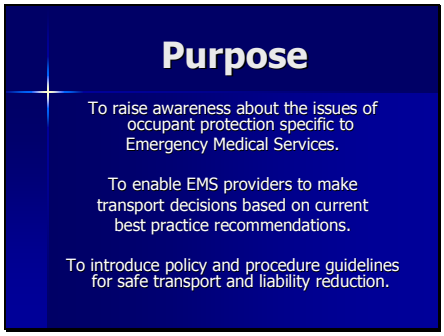
Welcome the students and introduce the instructor.

Ensure that all students have signed in.
Inform students that the class is pre-approved by Maine EMS for two category 1 CEHs. In order to receive the CEHs, students must send a copy of their certificate of attendance to Maine EMS when they renew their EMS license.

Remind students to silence cell phones and pagers (as able).

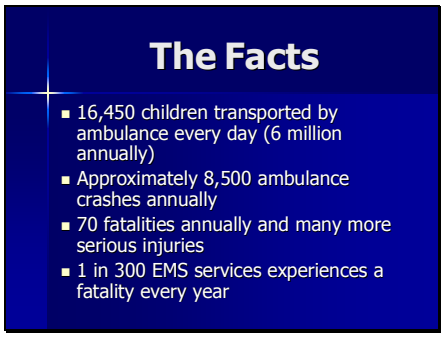
Inform students of where the emergency exits and bathrooms are located.

Slide 2



The intent of this class is to raise awareness about the risks associated with the transportation of children in ambulances and the guidelines and options that are available to help ensure a safe transport.

Slide 3



There is a 5x greater risk of death to passengers in the rear compartment of an ambulance compared to a passenger car.

EMS providers have more risk of being killed in the line of duty than firefighters or police officers. Most of these deaths are motor vehicle related.

Refer to Safe Ride News article "Occupant Protection for Ambulance Passengers" in the Appendix.

Slide 4

Video clip from AEV (American Emergency Vehicles).

Slide 5

Ambulance Crash # 1

- Nebraska – August 6, 2003
- 43 y.o. FF/EMT driver
- Non-emergency transport
- Pt on cot, head elevated w/chest, pelvis & leg straps (no shoulder harness)
- EMT-P Lt in attendant's seat, unrestrained

Refer to NIOSH: Death in the Line of Duty article in the Appendix.

Slide 6

NEBRASKA
AUGUST 6, 2003

Slide 7

Tragic Results

- 43 y.o. FF/EMT driver DIED
- Non-emergency transport
- Pt on cot, head elevated w/chest, pelvis & leg straps (no shoulder harness) EJECTED FROM COT; LANDED IN PASS-THROUGH
- EMT-P Lt in attendant's seat, unrestrained LANDED ON TOP OF Pt.

Emphasis that not securing the patient with the stretcher's shoulder harness allowed the patient to be ejected from the cot.

The unrestrained Paramedic followed the patient's trajectory path.

Slide 8

Ambulance Crash # 2

- New York – May 4, 2005
- 23 y.o. volunteer EMT
- 30 y.o. EMT-P
- Non-emergency transport
- Driver lost control while passing a dump truck, struck a tree

Slide 9

NEW YORK MAY 4, 2005

Slide 10

Tragic Results

- 23 y.o. volunteer EMT DIED
- Non-emergency transport
- 30 y.o. EMT-P DIED
- Driver (29 y.o.) and patient (67 y.o.) survived

Refer to "Ambulance Crashes into Tree, Killing Two Medical Technicians" http://www.nytimes.com/2005/05/04/nyregion/04crash.html

Slide 11

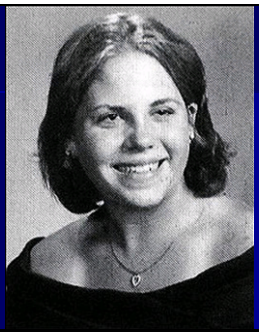


Photo of the 23 year old volunteer EMT who died as a result of the injuries sustained in this crash. She was the mother of a 3 year old son.

Slide 12

Ambulance Crash # 3

- Indiana – October 26, 1996
- 38 y.o. EMT-P, unrestrained
- Code 3 to hospital
- Driver lost control during evasive swerve, struck a tree

Slide 13

INDIANA
OCTOBER 26, 1996

Portage Fire Department, Portage, Indiana

Slide 14

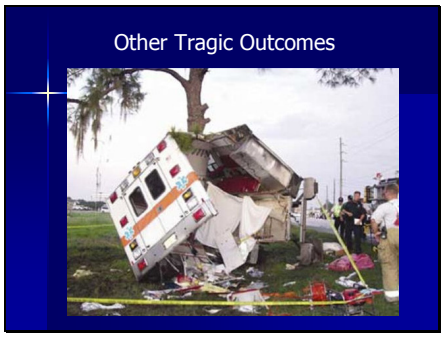
Tragic Results

- 38 y.o. EMT-P, unrestrained Multiple impacts with ambulance interior; fx 2 vertebrae; paralyzed and on ventilator; DIED 7 months later
- Driver and patient uninjured

From: http://www.supportingheroes.org/index.php?section=memorial&page=hero&hid=200

"FF/Paramedic Gilbert was in the back of an ambulance treating a patient being transported with lights and siren to a hospital. As the ambulance was passing a dump truck on the left, the dump truck made a left turn. The ambulance swerved and hit a tree. FF/Paramedic Gilbert was thrown to the front of the ambulance where he landed on his head and neck causing paralysis from the neck down. He died from complications of his injuries seven months later. He was well known for his work with the fire Dept and the city's SWAT Team. He was Indiana's Paramedic of the Year in 1995. He was an EMT, CPR, and ACLS instructor, a member of the Critical Incident Stress Debriefing Team and a Medic in the Marine Reserve Unit. He left behind a wife and three children."

Slide 15



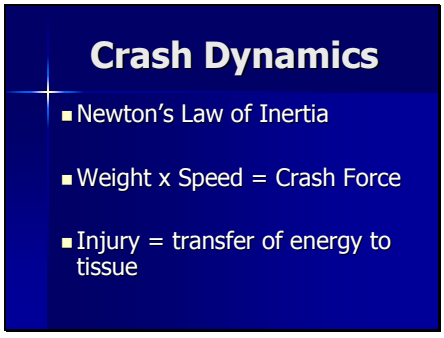
Various ambulance crashes

Note the lack of structural integrity of the ambulance box.

Slide 16

Slide 17

Slide 18

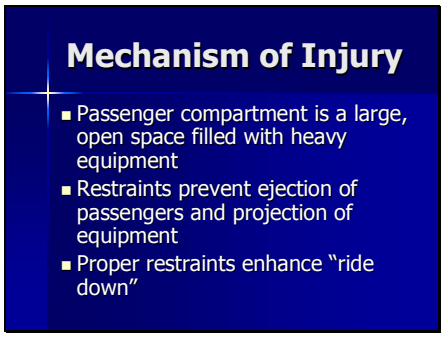


Newton's Law of Inertia: "An object in motion tends to stay in motion until acted upon by an outside force".

A 5 pound oxygen tank has 150 pounds of force during a 30 MPH crash.

The crash force experienced during a 40 MPH crash is equivalent to falling off a 50 foot cliff.

Slide 19

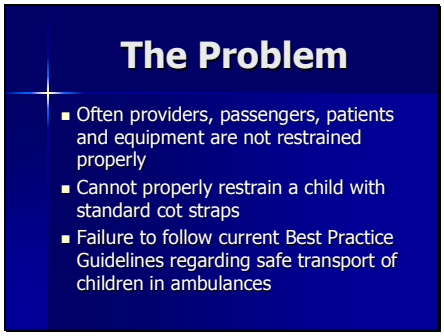


The ambulance compartment is a very unique environment with multiple pieces of equipment and various supplies.

Any item that is not properly restrained will become a flying projectile during a crash, including patients and crews.

"Ride down" is the elapsed time from the start of a crash to when the vehicle stops moving. The longer the "ride down", the less injury since the energy that would have caused an injury is transferred elsewhere.

Slide 20



Maine EMS requires that equipment, such as oxygen tanks, are secured so that they do not become flying projectiles.

Maine EMS requires that seat belts are provided in all permanent seating positions in the ambulance, including the bench seat.

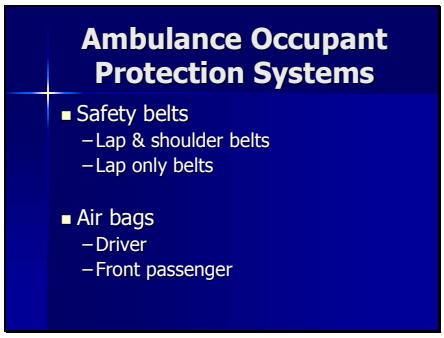
Maine EMS requires that the stretcher have at least three safety belts for the chest, hip and lower extremity. The head of the stretcher is required to be furnished with upper torso (over the shoulder) restraints designed to prevent motion of the patient during severe braking or in a crash.

Maine EMS expects providers to use safety belts to properly restrain patients and providers.

Standard stretcher straps are designed to restrain patients who weigh at least 90 pounds. The average child doesn't weigh 90 pounds until 10 to 12 years of age.

Refer to “Child and Provider Restraints in Ambulances” in the Appendix.

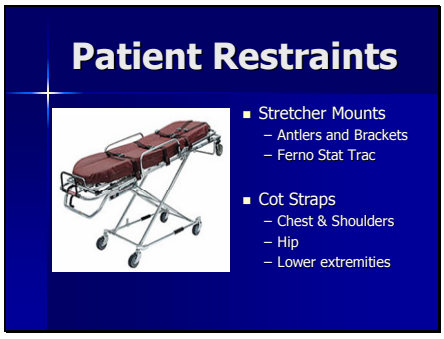
Slide 21



A 3 point lap & shoulder seat belt provides upper body restraint versus a lap only seat belt.

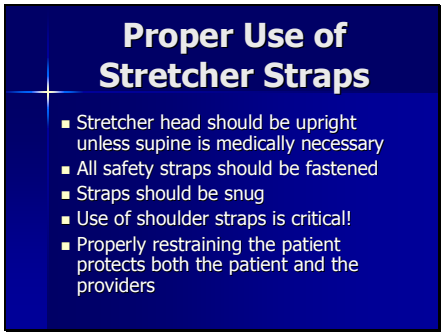
NEVER place a rear-facing child in front of an active air bag!!!

Slide 22



Maine EMS requires ambulances to have “crash-stable” fasteners to secure the stretcher to the floor or side walls.

Slide 23



A Semi-Fowlers or Fowlers position, with the head of the stretcher as upright as possible, will provide better crash protection for the patient and reduce the likelihood of the patient being ejected from the stretcher.

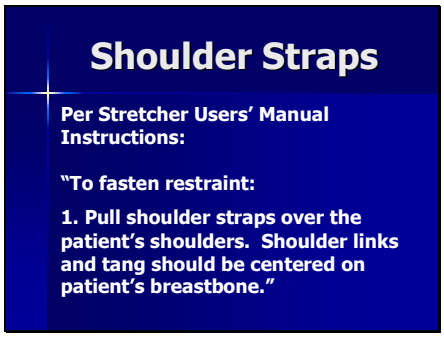
Snug straps reduce the distance a patient will move during a crash.

Shoulder straps help prevent the patient from being ejected from the stretcher.

Slide 24

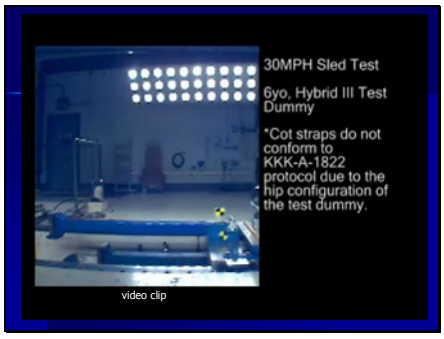
Note the shoulder straps meet at mid-chest level. The straps should lie on the stronger parts of the body (chest and mid-thigh).

Slide 25



An example of a stretcher manufacturer's instructions on the proper use of the shoulder straps.

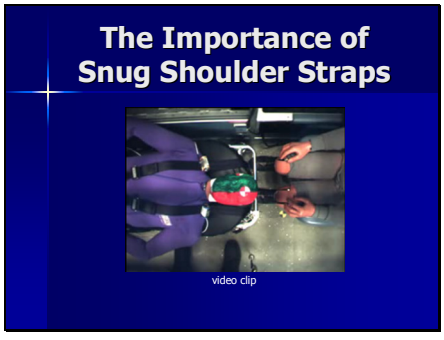
Slide 26



The video shows the force involved in a frontal collision to demonstration how a patient can be ejected from the stretcher and why the use of shoulder straps are very important.

Video was provided from SafeGuard.

Slide 27



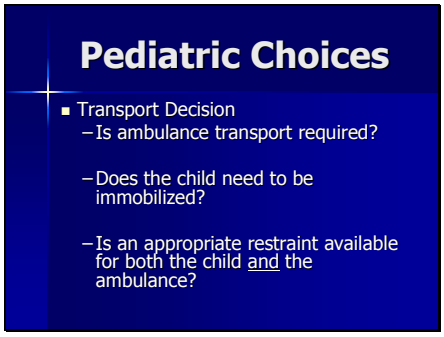
Crash test video to show the importance of snug shoulder straps.

Slide 28

A picture of the interior of an ambulance post-crash. The patient was not secured to the stretcher with shoulder straps and was ejected from the stretcher and landed between the two front cab seats.

Note the damage on the rear of the captain's chair indicating a point of impact by either a patient or a provider.

Slide 29

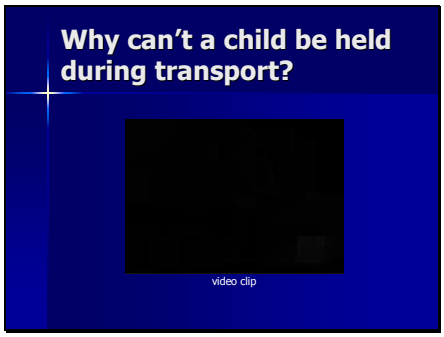


All transport options must be considered, including personal vehicle. Remember, children are 5x more likely to be killed in a crash when in a ambulance than in a passenger car.

If a decision to transport the child is made, spinal immobilization needs to be considered.

The agency or department providing the transport needs to evaluate the restraint options based on the patient's size and medical condition.

Slide 30

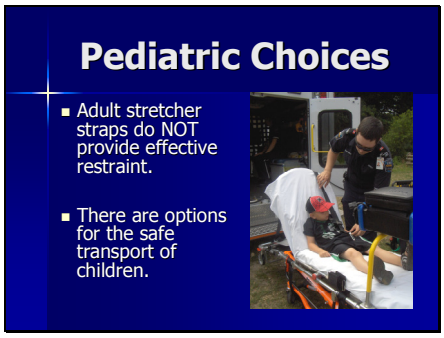


Review the crash force formula: weight x speed = crash force

A child who weighs 30 pounds will need 900 pounds of force to restrain them during a 30 MPH crash.

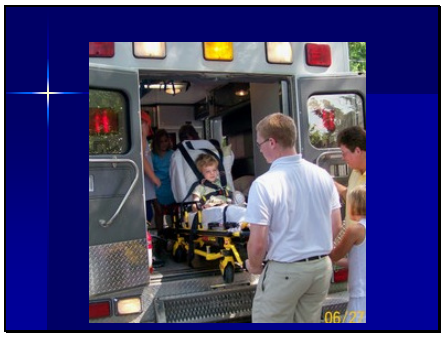
Most people cannot restrain 900 pounds.

Slide 31



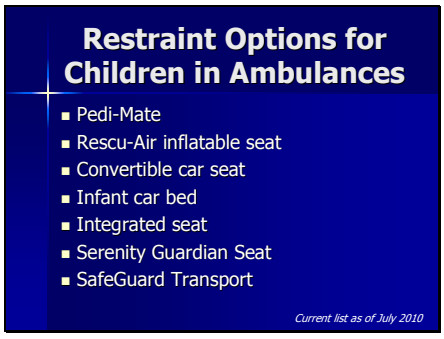
Introductory slide for the various restraint options for children.

Slide 32



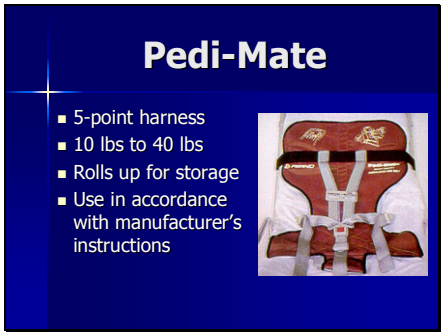
An example of small child who does not fit well in the stretcher straps.

Slide 33



Each restraint option will be discussed in detail in the following slides.

Slide 34



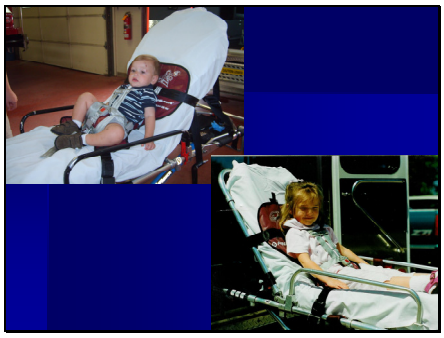
Installation misuse of the Pedi-Mate includes not attaching the straps in the proper locations on the stretcher and not securing the child properly in the harness.

Demonstrate the proper installation of the Pedi-Mate on a stretcher and how to properly use the harness by using a training doll.

<u>Refer to the Pedi-Mate Users' Manual in the Appendix.</u>

MSRP $249.00

Slide 35



A 2 year old child and a 4 year old are secured using the Pedi-Mate. Notice the black strap is at shoulder level. This positions the harness at shoulder level to limit the child's movement towards the front of the stretcher.

Slide 36

Inflatable car seat includes a 12V pump for inflation.

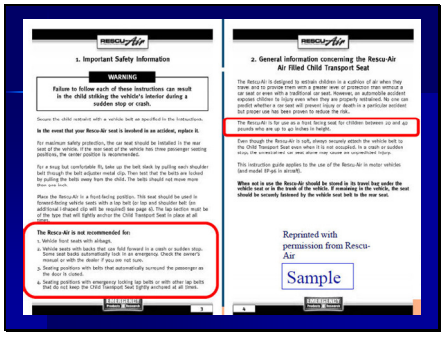
Certified for FMVSS 213 for forward facing use only. Has only been crash tested forward facing.

Rated only for 20 lbs to 40 lbs.

<u>Refer to Rescu-Air User Manual in the Appendix.</u>

MSRP $595.00

Slide 37



Rescu-Air instruction manual stating it is to be used forward facing only.

<u>Refer to the Rescu-Air User Manual in the Appendix.</u>

Slide 38

Rescu-Air shown installed on a stretcher. While it is only certified for forward facing, it is marketed to be used on a stretcher so that it is rear facing in the ambulance.

Note the “cot harness system” for stretcher attachment.

Slide 39

Conventional child safety seats meet strict Federal Motor Vehicle Safety Standards and provide optimum protection in a passenger vehicle crash. This similar protection is provided when used on an ambulance stretcher.

A convertible car seat means that the car seat can be installed rear-facing and then can “convert” to forward-facing when used in a car.

A belt path is the channel in the shell of the car seat in which a seat belt is threaded to secure the car seat to the vehicle.

A convertible car seat has two belt paths for installation in a passenger vehicle: one belt path is for rear-facing only and the other belt path is for forward-facing only.

Providers can determine whether a car seat is a convertible car seat by looking for the two belt paths. If two belt paths cannot be found, do not use the car seat on the stretcher since it won’t be able to be appropriately secured.

MSRP $60.00 and up

Slide 40

Demonstrate how to secure a convertible car seat correctly on the stretcher.

Thread the stretcher waist strap through the forward facing belt path of the car seat. Thread the stretcher hip strap through the rear facing belt path.

The convertible car seat should be installed tightly so it does not move any more than 1" when pulled side to side or front to back at the belt paths.

Note that the waist stretcher strap is attached to the frame of the stretcher in front of the side rail. This helps prevent the strap from sliding up the rail and allowing the seat to move up the head of the stretcher.

Refer to the "Crash Protection for Children in Ambulances: Recommendations and Procedures" in the Appendix.

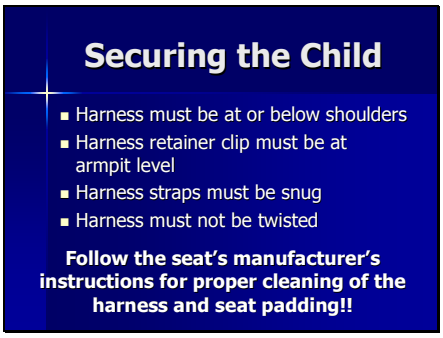
Slide 41

An infant seat can be identified by having a carry handle and only one belt path where the seat belt attaches the seat to the vehicle. Most infant seats also have a detachable base that installs into a vehicle.

Since an infant seat has only one belt path, it can only be installed at one attachment point. Therefore, it **cannot** be safely secured to the stretcher.

While infant seats perform extremely well in motor vehicle crash tests, infant seats that were crash tested on an ambulance stretcher did not perform well therefore using an infant seat is not recommended.

Slide 42



Demonstrate proper harnessing of the child. Be familiar with how to change the harness height and how to loosen and tighten the harness.

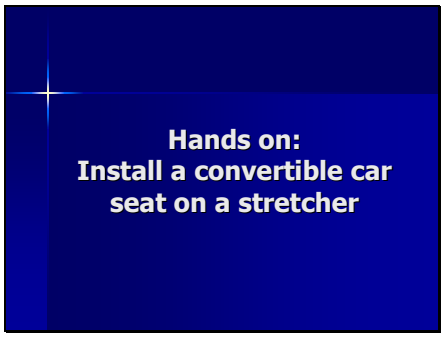
Key components of proper harnessing:
Harness must be at or below child's shoulders.
Harness retainer clip (chest clip) must be at armpit level.
Harness straps must be snug so that they lie flat on the child's body with no sagging.
Harness must not be twisted.

It is very important to follow the seat manufacturer's instructions for proper cleaning of the harness and padding as improper cleaning can damage the material and weaken it's performance in a crash.

Slide 43

A properly harnessed child in a convertible car seat secured to a stretcher. **Note** the harness straps are below the child's shoulders, the straps are snug, free of any twists and the harness retainer clip (chest clip) is at armpit level.

Slide 44



Assist students with properly installing a convertible car seat on a stretcher.

Using a doll, demonstrate and allow the students to practice adjusting the harness and properly securing the child.

Slide 45

A convertible car seat can be stored in an exterior compartment such as the first or second compartments on the driver's side of the vehicle.

Shelves may need to be raised and equipment relocated but there are several options for storage.

It is a good idea to store the car seat in a bag to keep it clean.

A laminated quick reference installation guide for providers can be included with the car seat.

Slide 46

The Cosco Ultra Dream Ride is the only car bed that has been tested and is approved to be secured on an ambulance stretcher.

The Dream Ride is sold with only one set of belt loops for installation in a vehicle. An additional set of loops must be obtained from the manufacturer to secure the car bed to a stretcher.

For installation instructions, refer to the "Crash Protection for Children in Ambulances: Recommendations and Procedures" in the Appendix.

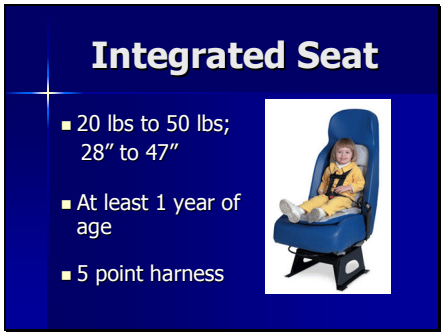
MSRP $112.95

Slide 47

A car bed secured to a stretcher. The child is transported side facing on the stretcher. Note the provider is secured with a seat belt.

The stretcher chest strap threads through the belt loops on one side of the car bed while the hip strap threads through the other two belt loops to secure the other side of the car bed.

Slide 48



An integrated seat has a child restraint built-in to the attendant seat.

Cannot be used for infants (must be at least 20 pounds and 1 year old).

Designed to transport a child who is a non-patient (if their parent or caregiver requires transport, the child can be safely transported as well).

Follow manufacturer's instructions.

Slide 49

Attendant seat with an integrated infant seat and child 5-point harness restraint.

Three seats in one
Adult 4-point shoulder restraint system.
Child seat for children who are at least 1 year old and 23 to 85 pounds.
Infant seat for children who weigh 5 to 22 pounds.

<u>Refer to Guardian Safety Seat flier in the Appendix.</u>

Slide 50

Video of the Guardian Safety Seat.

Slide 51

Child safety seat specially designed for use on an ambulance stretcher.

Folds flat to 29.5” x 17” x 6.5” and weighs less than 20 pounds.

5 point harness secures a child 22 to 100 pounds.

Self-adjusting harness lowers to shoulder level as the harness is tightened.

Stickers attach to stretcher frame to show where to properly attach seat straps for installation.

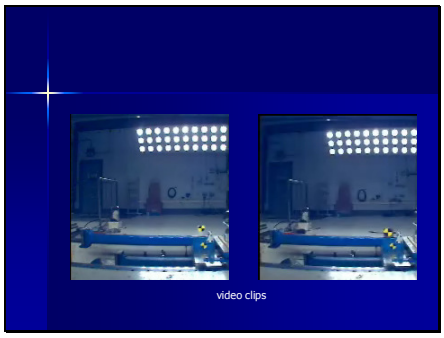
<u>Refer to SafeGuard Transport flier in the Appendix.</u>

MSRP $599.00

Slide 52

Installation video of the SafeGuard Transport.

Slide 53



Two crash test videos by SafeGuard
30 MPH
6 year old crash test dummy

First video: child on stretcher with improperly fitted stretcher straps. **Note** how much the dummy moves off the front of the stretcher.
Second video: child secured with SafeGuard Transport. **Note** the reduced forward movement.

Slide 54

The child in the picture has been immobilized in his own car seat after a crash.

The car seat is a combination car seat, used in a forward-facing position only.

A combination seat is a seat that is a 5 point harness forward-facing car seat that can turn into a belt-positioning booster seat.

Combination car seats have only one belt path so, like infant seats, they cannot be properly secured to the stretcher. **Point out** the one belt path located behind the child's back.

Slide 55

The Multi-Grip Head Immobilizer device manufactured by I-Tec Manufacturing is advertised for use in an infant seat.

An infant seat **cannot** be properly secured to the stretcher.

Slide 56

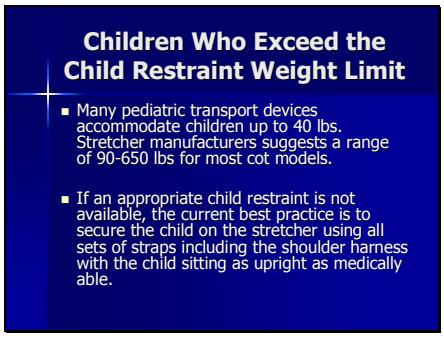
Refer to Maine EMS Protocol for Spine Assessment Protocol

Some pediatric immobilization options, clockwise from top left:
Pedi-Pac by Ferno, MSRP $299.00
Pedi-Sleeve by Ferno, MSP $499.00
Infant/Pediatric Immobilization Board by Life Support Products, Inc, MSRP $364.00
Pedi Air Align by Iron Duck, MSRP $185.00

State that other pediatric immobilization options are available. This represents a small sampling of the available products.

State that whichever product is used, it must be used in accordance with manufacturer's instructions and <u>properly secured to the stretcher</u>.

Slide 57

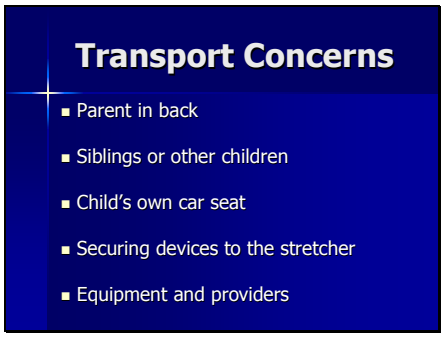


There is sometimes a gap between the weight limits of the available pediatric restraints and the stretcher straps where there are no available options to transport the child in the safest manner.

At the very least, secure the child on the stretcher using all straps and placing the child as upright as possible.

Departments and agencies need to consider the various transport situations they face and determine what equipment to supply to safely transport all patients.

Slide 58



Having a parent in the back of the ambulance has pros and cons. The pros are that the medical history and demographics about the child can be obtained from the parent (though this information can be obtained if they are in the front passenger seat as well). The cons are that the parent may interfere with patient care and there may not be enough room for the parent. If the parent is going to transport in the back of the ambulance, ensure that they are restrained with a seat belt.

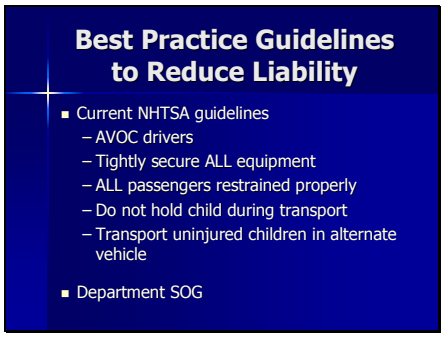
There is not a safe location in the back of an ambulance to secure non-patient children (with the exception of an integrated child safety seat). Transporting non-patient children in an alternate vehicle is preferred. If a non-patient child is to be transported in the front passenger seat of the ambulance, they must be at least 1 year old AND 20 pounds AND forward-facing. Move the vehicle seat as far back away from the dash as possible and use appropriate child restraints/seat belts. All children who are less than 1 year old AND who weigh less than 20 pounds **MUST** be rear-facing. **NEVER place a rear-facing child in front of an active air bag!!!**

The only car seat that is recommended for use on the stretcher is a convertible car seat. Do not use a child's car seat that is not a convertible car seat.

Loose objects, unsecured equipment and unrestrained providers pose a risk of injury or

death to both the patient and the other occupants as they become flying projectiles during a crash or a sudden stop.

Slide 59



Refer to the EMS-C "Do's and Don'ts of Transporting Children in an Ambulance" in the Appendix.

Refer to the sample SOG in the Appendix.

Slide 60

Refer students to the Appendix and to local, state and national resources.

Collect class evaluation forms.

Distribute certificates of attendance.